ELECTRO-GRAVITIC PROPULSION

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Immense progress has been made in the field of air navigation since Clément Ader first flew his *Eole* over a distance of fifty yards on October 9th, 1890. But the basic principles have not changed.

The propulsive force generated by the power unit in one way or another counterbalances the vehicle's weight due to terrestrial attraction. Though localized to the vehicle's centre of gravity for the sake of simplicity, this force of weight in reality acts on every atom of material. On the other hand, the propulsive force, whose point of application is really localized to the power unit, is transmitted to the whole vehicle because of the latter's rigidity. The balance between these two forces, which in order to be complete would have to be provided at the atom level, is thus obtained only on the average. Because of the vehicle's inertia and its finite solidity, this limits the accelerations possible to a few *g*.

For propulsion to be ideal a balance would have to be created on the atomic level. This is a new approach to the problem which has virtually no point of contact with the present solution.

It would no longer be a matter of generating a force localized at one point, but a field of inertial forces roughly uniform in the whole of the region around the vehicle. With weight thus being balanced on the atom level, there would no longer be any limitation on the accelerations possible.

As this field of forces is no longer strictly localized, the air adjacent to the vehicle will also be carried along. The heat barrier, ultimate limiting factor to the speed of present aircraft, will disappear. Actually, however, the field will decrease as distance from the generator increases. Thus only part of the air will be carried along ; nevertheless the maximum speed obtainable will be very high.

The ability to create such a field of forces presupposes a very wide knowledge of the exact nature of mass and the attraction between two masses. As Professor Bryce S. DeWitt, of Berkeley University, put it in 1953 : " Before anyone can have the audacity to formulate even the most rudimentary plan of attack on the problem of harnessing the force of gravitation, he must understand the nature of his adversary. I take it as almost axiomatic that the phenomenon of gravitation is poorly understood even by the best of minds, and that the last word on it is very far indeed from having been spoken."

Though electrically neutral in the mean, matter is built up of enormous quantities of negative electricity (electrons) and positive electricity (protons). The force of gravitational attraction between two masses of hydrogen of 1 gramme each placed 10 m apart is only 6.7×10^{-14} dynes. The Coulomb force which would exist if these masses consisted solely of protons would be 0.8×10^{14} tonnes, or 1.2×10^{38} times as powerful. An attempt may be made to explain gravitational attraction as due to a very small residue of interaction between electrized particles. Such an attempt at explanation must be guided by the specific characteristics of gravitation.

Gravitational force is always attractive. The only case in which identical electromagnetic quantities are mutually attracted is that of two parallel currents (charges in motion) moving in the same direction. Gravitation may then be connected with kinetic electromagnetic quantities, for example, the multi-polar moments in the nuclei.

In addition, the gravitic field is independent of the medium interposed between the active bodies. It has in fact been verified, during eclipses of the moon, that solar attraction on our satellite is in no way modified by the interposition of the earth. If this field is electro-magnetic, the phenomenon must have a very much higher frequency than anything that has been observed so far. This confirms the hypothesis that the attraction is due to intranuclear movements which could take place at these frequencies.

It is thus clear that knowledge of the nature of gravitational forces is closely connected with the nature of the atomic nucleus. As Frederik J. Belinfante wrote in 1955 : " The discovery of many new types of strange particles during recent years has drawn new attention to the fact that we really don't understand why those particles exist with the properties we observe. Why is a proton 1,836 times heavier than an electron ? Why is there no neutral mu-meson of mass 200 ? Why is hc/e^2 equal to 137 ? An ultimate theory of matter should explain such things. Heisenberg thinks that such an ultimate theory will describe all particles and all of their interactions by the behavior of one single field. Such a field theory would necessarily be non-linear ; otherwise it could not account for the interactions. Describing everything, it must also describe gravity. In order to get used to these two features of the ultimate theory of matter, we do well if we prepare for the future by studying now the non-linear theory of gravitation which we do already possess."

This theory is the unified field theory elaborated by Einstein and Schrödinger. Going back to the fundamentals of the ideas of space and time, Einstein attempted to describe the physical world in a single geometric form. In the unified field theory the basic laws of geometric space are such that the electro-magnetic field and the gravitational field appear as a single super-field. The latter can be split up approximately into an electro-magnetic and a gravitational field only when one of them is markedly preponderant. This theory uses the framework of abstract geometrical spaces and a large number of symbols whose physical interpretation is extremely difficult.

This interpretation is all the more difficult in that, though numerous purely electromagnetic or purely gravitational phenomena are known, there are practically no examples where the two fields are closely mingled, except perhaps Blackett's effect, namely the magnetic field engendered by the masses in rotation (earth, sun, other stars and probably the galaxy).

The latter phenomenon should be the counterpart to the generation of the field of propulsive forces considered above. Such propulsion must thus be described as electro-gravitational. This definition, however, qualifies only the principle of the generator, but gives no help towards its practical realization.

In 1955 *Ansel E. Talbert* wrote in the " New York Herald Tribune " : " Up to now no scientist or engineer—so far as is known in scientific circles—has produced the slightest alteration in the magnitude or direction of gravitational force although many cranks and crackpots have claimed to be able to do this." But this certainly does not mean that the thing is impossible and that our century will not see vehicles with electro-gravitational propulsion. After all, it took only some ten years to reach industrial mastery of atomic energy. *George S. Trimble*, Vice-President of The Glenn L. Martin Company, recalled this fact when, referring to electro-gravitational propulsion (a problem which his company was the first to tackle in the United States), he said : " I think we could do the job in about the time that is actually required to build the first atomic bomb if enough trained scientific brain-power simultaneously began thinking about and working towards a solution. Actually the biggest deterrent to scientific progress is a refusal of some people, including scientists, to believe that things that seem amazing can really happen."